

RELATIONSHIPS OF HEDYOTIS FRUTICOSA L. TO

HOUSTONIA L. AND OLDENLANDIA L.

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Hedyotis fruticosa L. is one of three Hedyotis species described by Linnaeus in Flora Zeylanica (1747) and Species Plantarum (1753). Bremekamp (1939, 1952) established and Bullock (1958) concurred that Hedyotis fruticosa rather than Hedyotis auricularia L. is the type species because it is the only species fitting the generic description of Hedyotis in Linnaeus's Genera Plantarum (1754).

The purposes of these notes are, first, to provide morphological information about the little-known type species, Hedyotis fruticosa, and, second, to compare it with the type species of the related genera Houstonia L. and Oldenlandia L. The following herbarium materials have been studied: (1) Hedyotis fruticosa from Ceylon and India, (2) all known species of Houstonia and Oldenlandia from the United States and Mexico, and most of the species occurring in the West Indies, Central America, and South America, (3) various species of the American genera Arcytophyllum and Bouvardia, and, (4) about thirty Asian species of Hedyotis and Oldenlandia.

Hedyotis fruticosa (Figure 1) is a shrub occurring in Ceylon below 1000 m. elevation (cf. Trimen 1894) and in India in the Travancore Mountains of southern Madras State (Hooker 1880). A number of shrubby species of Hedyotis in Ceylon, India, China, and southeast Asia are obviously closely related to H. fruticosa, as shown by their capsule and seed morphology. These include H. acuminatissima Merr., H. acutangula Champ. ex Benth., H. cymosa Thw., and H. exserta Merr. Some other species, e.g., H. hedyotidea (DC.) Merr., H. dimorpha Craib, H. scandens Roxb., and H. uncinella Hook. & Arn. appear transitional to or more like H. capitellata Wall. ex G. Don. All of these, however, may belong to the same species-group as H. fruticosa, although H. capitellata is an extreme differing conspicuously in corolla structure. Still other Asian species, e.g., H. vestita R. Br. ex G. Don, are closely related to Exallage auricularia (L.) Brem. (Hedyotis auricularia L.), segregated from Hedyotis by Bremekamp (1952). In addition to these species-groups, there are a large number of unstudied Asian species of Hedyotis, Oldenlandia, and Anotis whose relationships remain to be determined.

It is apparent that Hedyotis fruticosa is the nucleus of a group of related species occurring in southern and southeastern Asia. Whether any related species occur in Africa or Australia is unknown. In examining Western Hemisphere taxa I did not find any species resembling the Hedyotis fruticosa group; therefore Hedyotis is an Asian or at least an Eastern Hemisphere genus. Oldenlandia is already known to have a worldwide distribution. As far as is known, Houstonia is an American genus.

Relationships of Genera

Relationships among Hedyotis, Houstonia, and Oldenlandia have long been controversial due to their apparently overlapping characteristics. A complete review of taxonomic opinion about the three genera is beyond the scope of the present paper. Botanical opinion in the United States has usually treated the three genera as distinct; however, in recent years some botanists have taken up Hedyotis sens. lat. to include all three genera, following the advice of Fosberg (1937, 1943, inter alia), Shinnars (1949), and Lewis (1961). Since my revision of the Houstonia purpurea group (1959), I have continued to recognize Houstonia as distinct on the grounds that no firm evidence was ever presented to back up the merger. More recent unpublished studies of mine indicate that Hedyotis sens. lat. should be split into more than three genera. Fosberg (1943) and Lewis (1961, 1962), while stating that they preferred to place all taxa in one genus, at the same time recognized subgenera within Hedyotis; e.g., subg. Oldenlandia, subg. Edrisia (Houstonia), subg. Kadua, subg. Oceanica, and subg. Polynesiotis. Many botanists would consider the characteristics used to separate these subgenera as quite sufficient to separate genera. Modern floras outside the United States generally recognize Oldenlandia as distinct; e.g., Flora of West Tropical Africa (Hepper 1963), Flore du Gabon (Hallé 1966), and Flowering Plants of Jamaica (Adams 1972). In his monograph of Oldenlandia in Africa Bremekamp (1952) segregated additional genera from Oldenlandia sens. lat.

Comparison of type species

The more important characteristics of the type species (Hedyotis fruticosa, Houstonia caerulea, and Oldenlandia corymbosa) are compared in Table 1. Hedyotis fruticosa has thick-walled, oblong, and fully inferior capsules with the calyx forming a cupule around the capsule apex. The bicarpellate capsules dehisce septicidally (Figure 2) and sooner or later separate completely into two units. By the time separation is complete, each carpel is also split open vertically along the median ventral face. These carpel units with their eventually

conspicuous, gaping openings appear unique to the Hedyotis fruticosa species-group. In sharp contrast to Hedyotis, Oldenlandia corymbosa and Houstonia caerulea capsules are thin-walled, fragile, more or less subglobose, and vary from 1/4 to 7/8 inferior. Dehiscence is primarily loculicidal, sometimes secondarily septicidal along the fragile septum. Seeds of the three genera differ in shape, size, number per capsule, and hilar morphology (Table 1); these characteristics will be elaborated in a later publication. Oldenlandia sens. str. and Houstonia sens. str. have different basic chromosome numbers. Although Lewis (1962) showed that Houstonia sens. lat. has at least five series of chromosome numbers, these numbers either differ from Oldenlandia or else those groups having the same number are obviously morphologically different.

Comparison of type species of the three genera (Table 1) reveals important differences in fundamental characteristics of the fruits and seeds. This evidence alone strongly suggests the existence of three genera rather than one.

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References

- Adams, C. D. 1972. Flowering Plants of Jamaica. University of the West Indies, Mono, Jamaica.
- Bremekamp, C. E. B. 1939. Pleiocraterium genus novum Rubiacearum Hedyotidearum. Rec. Trav. Bot. Neerl. 36: 438-445.
- _____. 1952. The African species of Oldenlandia L. sensu Hiern et K. Schumann. Verhand. Kon. Ned. Akad. Wetensch. Nat. 2nd ser., 48(2): 1-284.
- Bullock, A. A. 1958. Nomenclatural notes: VI. Kew Bull. 13: 97-99.
- Fosberg, F. R. 1937. Some Rubiaceae of Southeastern Polynesia. Bishop Mus. Occas. Pap. 13: 245-293.
- _____. 1943. The Polynesian species of Hedyotis. Bishop Mus. Bull. 174: 1-102.

- Hallé, N. 1966. No. 12. Rubiacees (1re partie). In: Flore du Gabon. A. Aubreville (director). Mus. Nat. Hist. Nat., Paris.
- Hepper, F. N. 1963. Hedyotideae, Rubiaceae. In: Flora of West Tropical Africa. 2nd ed. Vol. 2. F. N. Hepper, ed. Crown Agents, London.
- Hooker, J. D. 1880. The Flora of British India. Vol. 3. L. Reeve & Co., London.
- Lewis, W. H. 1961. Merger of the North American Houstonia and Oldenlandia under Hedyotis. Rhod. 63: 216-223.
- _____. 1962. Phylogenetic study of Hedyotis (Rubiaceae) in North America. Amer. Jour. Bot. 49: 855-865.
- Shinners, L. H. 1949. Transfer of Texas species of Houstonia to Hedyotis (Rubiaceae). Field & Lab 17: 166-169.
- Terrell, E. E. 1959. A revision of the Houstonia purpurea group (Rubiaceae). Rhod. 61: 157-180; 188-207.
- Trimen, H. 1894. A Hand-Book to the Flora of Ceylon. Vol. 2. Dulau & Co., London.

Table 1. Comparison of type species of Hedyotis, Houstonia, and Oldenlandia

	<u>Hedyotis fruticosa</u>	<u>Houstonia caerulea</u>	<u>Oldenlandia corymbosa</u>
Habit	shrub	low herb	low herb
Inflorescence	terminal, corymbiform, many-flowered	fls. solitary on elongate term. or axil. pedicels	axillary, 1-4 flowered cymes
Corolla	funnelform	salverform	short-funnelform or subrotate
Capsule	inferior; oblong, sclerified; calyx cupulate	partly inferior; subglobose or flattened, thin-walled	partly inferior; subglobose, thin-walled
Dehiscence (primary)	septicidal; carpels become split on median face	loculicidal	loculicidal
Seeds: shape	oval or oblong, flat, with margins thin or winged	globose	tetragonal
no./capsule	several	ca. 15-30	numerous (+ 50)
diameter	0.6-0.9 mm.	0.4-0.7 mm.	0.3-0.4 mm.
hilum	low ridge on ventral face	large cavity	punctate at apex of angle
Chrom. no.	not known	$x=8$	$x=9$
Distribution	Ceylon, India	eastern North America	pan-tropic weed



Figure 1. Hedyotis fruticosa from Ceylon in Herbarium Benthamianum (K).

